

可靠性测试报告

产品名称： Ai-WB2-07S

产品型号： WB2 系列

测试日期： 2022/07/07~2022/07/12

测试人： 刘群

审核人： 卢信桂

1. 检验计划

序号	工序名称	检验项目	检验工具	抽样水平(参考 GB/T 2828.1-2012)	允收水准		
					CR(致命缺陷)	MA(严重缺陷)	MI(轻微缺陷)
1	可靠性测试	高低温存储/高常低温开关机/高低温运行/交变湿热/冷热冲击	恒温恒湿试验机	正常一次抽样, 特殊检验 S-1	0 收 1 退		

2. 试验项目

编号	项目	测试条件
1	低温存储测试 (Low temperature storage test)	测试条件: -40°C 测试时间: 8hrs 在 -40°C 下停留8hrs后, 做冷启动测试.
2	高温储存测试 (High temperature storage test)	测试条件: 100°C 测试时间: 8hrs 恢复到 85°C 停留1hrs后, 做热启动测试。
3	低温运行测试 (Low temperature operation test)	测试条件: -40°C 测试时间: 24hrs
4	高温运行测试 (High temperature operation test)	测试条件: 85°C 测试时间: 24hrs
5	开关机测试 (AC power on/off test with temperature)	A) 温度: -40°C . B) 温度: 25°C C) 温度: 85°C . 每个条件循环 200次, 开30sec, 关30sec
6	交变湿热测试 (Alternating hot and humid test)	A) $85^{\circ}\text{C}+93\text{RH}$ 运行4hrs; B) $25^{\circ}\text{C}+93\text{RH}$ 运行4hrs; 循环步骤A步骤B总共2个循环.
7	冷热冲击测试 (Thermal shock test)	测试条件: $-40^{\circ}\text{C}\sim 100^{\circ}\text{C}$, 每个温度停留30mins, 温度变换时间为升温50mins, 降温2hrs. 测试时间: 循环5cycles

3. 试验准备

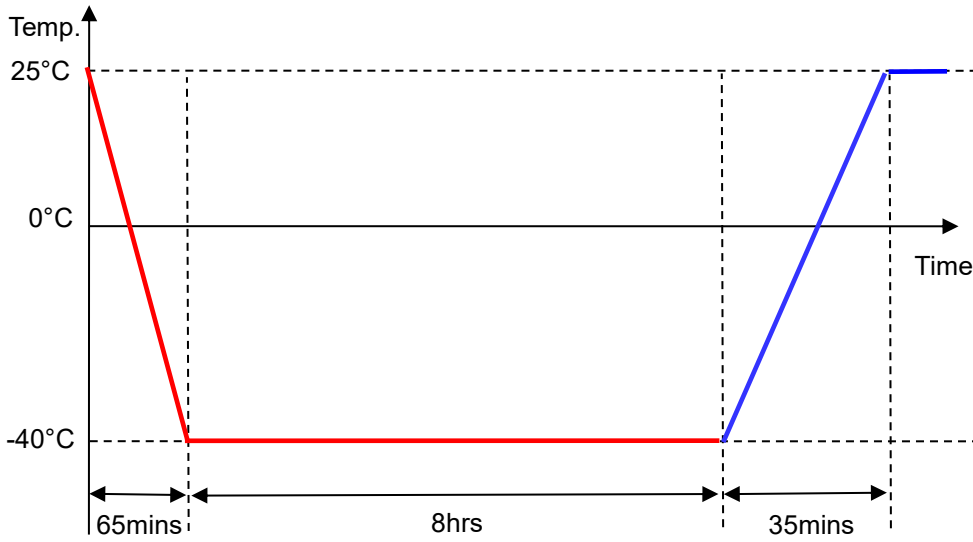
编号	项目	图片/附件
1	可靠性说明文档	 WB2系列模组 可靠性WIFI&蓝牙
2	实验设备	
3	样品摆放	
4	测试原因	新产品

4. 低温存储测试 (Low temperature storage test)

测试条件: 关机测试, 让产品储存在-40° C下保持8hrs, 然后做冷启动测试.

测试曲线:

Is Power Off ————
Is Power On ————



测试标准:

1. 冷启动时功能正常, 确认 ping 包不丢失, 即判定模组功能正常。
2. 测试蓝牙发送指令 AT+BLEINIT=2 打开蓝牙, 设置好蓝牙应用名。再打开 BLE 调试助手搜索蓝牙名称如 (BL-AT7/8/9/10/11/12), 如搜索不到即测试失败。
3. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

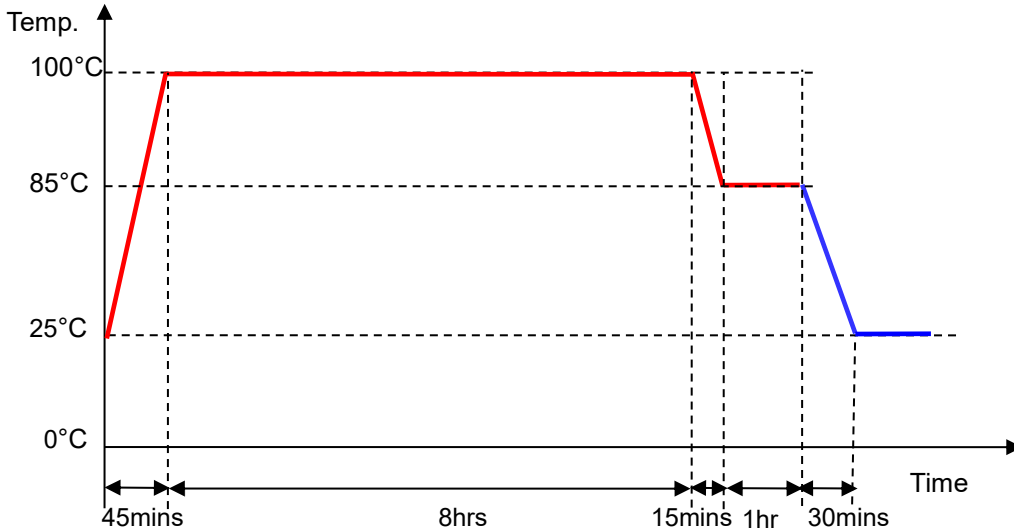
测试样机	测试数据	测试结果
<p>6pcs (BL-AT7~BL-AT12)</p>	<p>The screenshot shows three windows of AT+PING test results, each displaying ping statistics like 'Ping 统计值' and 'Ping 成功率'. Below these is a screenshot of the 'BLE调试助手' (BLE Debug Assistant) app. The app's 'Scanner' tab is active, showing a list of discovered BLE devices with their names (e.g., BL-AT7, BL-AT11, BL-AT10, BL-AT12, BL-AT9, BL-AT3, BL-AT6, BL-AT8) and signal strengths (e.g., -61 dBm, -60 dBm, -85 dBm, -53 dBm, -50 dBm, -54 dBm, -56 dBm, -48 dBm). All devices are marked as 'NOT BONDED'.</p>	<p>PASS</p>

5. 高温存储测试 (High temperature storage test)

测试条件：关机测试，让产品储存在 100° C 高温下 8hrs，然后恢复到 85° C 停留 1hr 后，做热启动测试。

测试曲线：

Is Power Off ——
Is Power On ——



测试标准：

1. 热启动时功能正常，确认 ping 包不丢失,即判定模组功能正常。
2. 测试蓝牙发送指令 AT+BLEINIT=2 打开蓝牙，设置好蓝牙应用名。再打开 BLE 调试助手搜索蓝牙名称如 (BL-AT7/8/9/10/11/12)，如搜索不到即测试失败。
3. 产品测试完后没有可见的损伤，如收缩、剥离、变色等现象。

测试样机	测试数据	测试结果
<p>6pcs (BL-AT7~BL-AT12)</p>		<p>PASS</p>

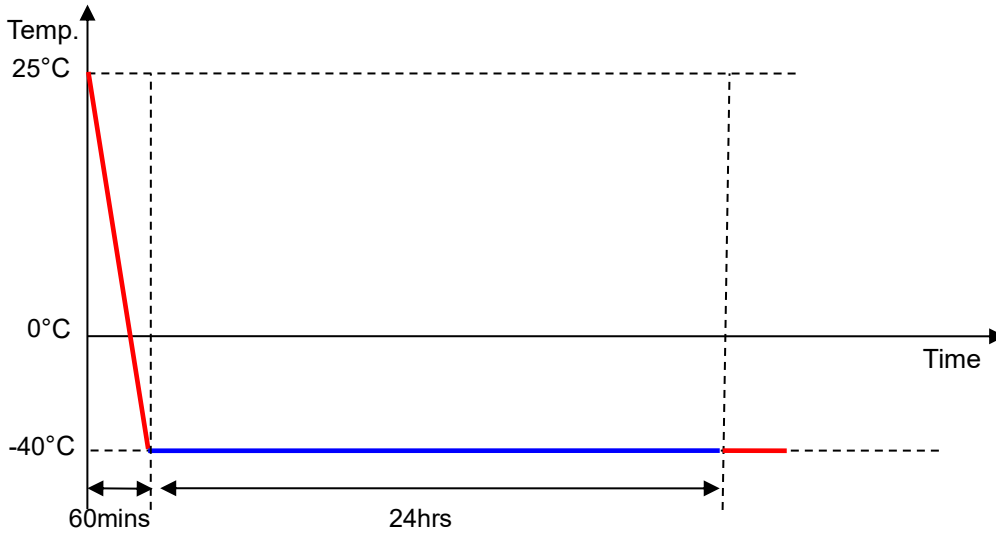
6. 低温运行测试 (Low temperature operation test)

测试条件: 开机测试, 在-40° C下运行24hrs.

测试曲线:

Is Power Off ——

Is Power On ——



测试标准:

1. 测试过程中无断网等现象, 确认 ping 包不丢失, 即判定模组功能正常。
2. 测试过程中打开 BLE 调试助手搜索蓝牙名称如 (BL-AT7/8/9/10/11/12), 如搜索不到即测试失败。
3. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

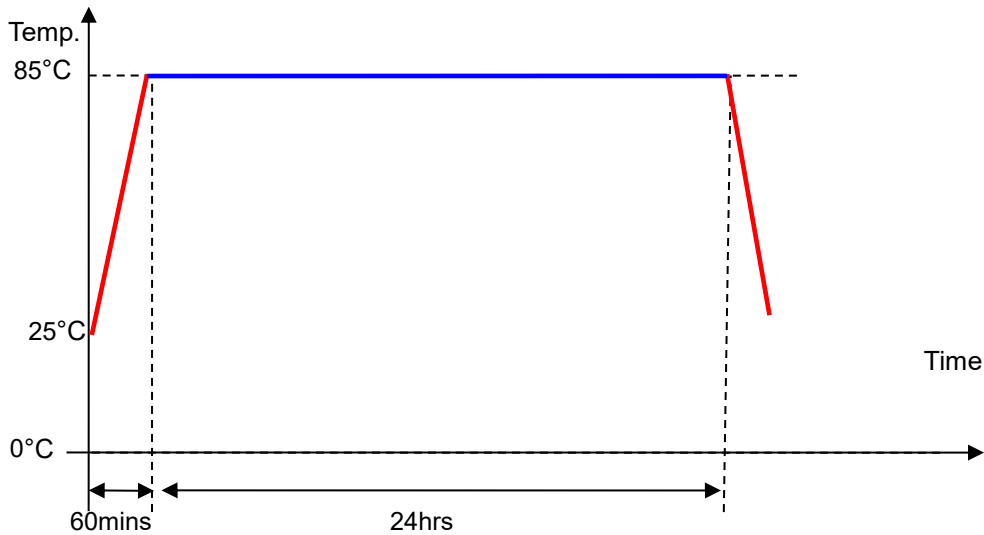
测试样机	测试数据	测试结果
<p>6pcs (BL-AT7~BL-AT12)</p>	<p>The test data section contains screenshots of the ATKEEPING software interface, showing ping test results for various modules. Below the screenshots is a screenshot of the 'BLE调试助手' (BLE Debugging Assistant) app, which displays a list of discovered BLE devices: BL-AT10, BL-AT8, BL-AT11, BL-AT12, BL-AT9, and BL-AT7, each with its MAC address and signal strength.</p>	<p>PASS</p>

7. 高温运行测试 (High temperature operation test)

测试条件: 步骤 85 °C运行24H

测试曲线:

Is Power Off _____
Is Power On _____



测试标准:

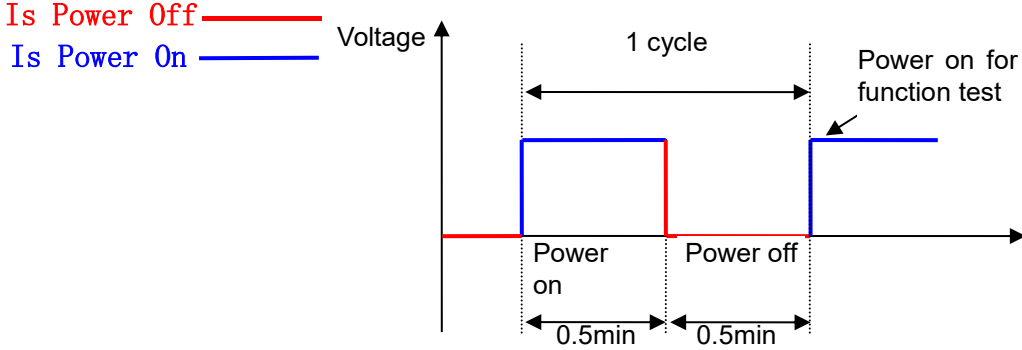
- 1.测试过程中无断网等现象, 确认 ping 包不丢失,即判定模组功能正常。
- 2.测试过程中打开 BLE 调试助手搜索蓝牙名称如 (BL-AT7/8/9/10/11/12), 如搜索不到即测试失败。
- 3.产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

测试样机	测试数据	测试结果
<p>6pcs (BL-AT7~BL-AT12)</p>	<p>The screenshot shows the ATKOPING application interface with multiple windows displaying ping test results for various hosts. Below this, the BLE调试助手 (BLE Debug Assistant) app interface is shown, displaying a list of detected Bluetooth devices. The list includes BL-AT8, BL-AT7, BL-AT6, BL-AT12, BL-AT10, BL-AT3, BL-AT11, and BL-AT9, each with its MAC address and signal strength (e.g., -50 dBm, -72 dBm, etc.).</p>	<p>PASS</p>

8. 开关机测试 (AC power on/off test with temperature)

- 测试条件:
1. 开机: 30 秒; 关机: 30 秒。
 2. 温度: -40°C, 25°C, 85°C。
 3. 循环: 每组测试条件循环 200 次。

测试曲线:



测试标准:

1. 上电工作后能够正常启动, 测试过程中机器正常启动, 每次 ping 包都有连通, 即判定模组功能正常。
2. 测试蓝牙发送指令 AT+BLEINIT=2 打开蓝牙, 设置好蓝牙应用名。再打开 BLE 调试助手搜索蓝牙名称如 (BL-AT7/8/9/10/11/12), 如搜索不到即测试失败。
3. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

项目	测试样机	测试数据	测试结果
<p>常温开关机</p>	<p>6pcs (BL-AT7~BL-A T12)</p>		<p>PASS</p>

低温开关机
6pcs
(BL-AT7~BL-A
T12)

6pcs
(BL-AT7~BL-A
T12)

The image shows the ATKOPING software interface for configuring several devices. The configuration panels for BL-AT7, BL-AT11, BL-AT10, BL-AT12, and BL-AT8 are visible, showing parameters like MAC address, baud rate, and power settings. Below the configuration panels is a screenshot of the BLE调试助手 (BLE Debug Assistant) application. The app displays a list of discovered BLE devices under the 'Scanner' tab, including BL-AT9, BL-AT7, BL-AT11, BL-AT10, BL-AT12, and BL-AT8, along with their MAC addresses and signal strengths.

PASS

高温开关机
6pcs
(BL-AT7~BL-A
T12)

6pcs
(BL-AT7~BL-A
T12)

The image shows the ATKOPING software interface for configuring several devices. The configuration panels for BL-AT6, BL-AT4, BL-AT11, BL-AT8, BL-AT12, BL-AT9, BL-AT10, and BL-AT7 are visible, showing parameters like MAC address, baud rate, and power settings. Below the configuration panels is a screenshot of the BLE调试助手 (BLE Debug Assistant) application. The app displays a list of discovered BLE devices under the 'Scanner' tab, including BL-AT6, BL-AT4, BL-AT11, BL-AT8, BL-AT12, BL-AT9, BL-AT10, and BL-AT7, along with their MAC addresses and signal strengths.

PASS

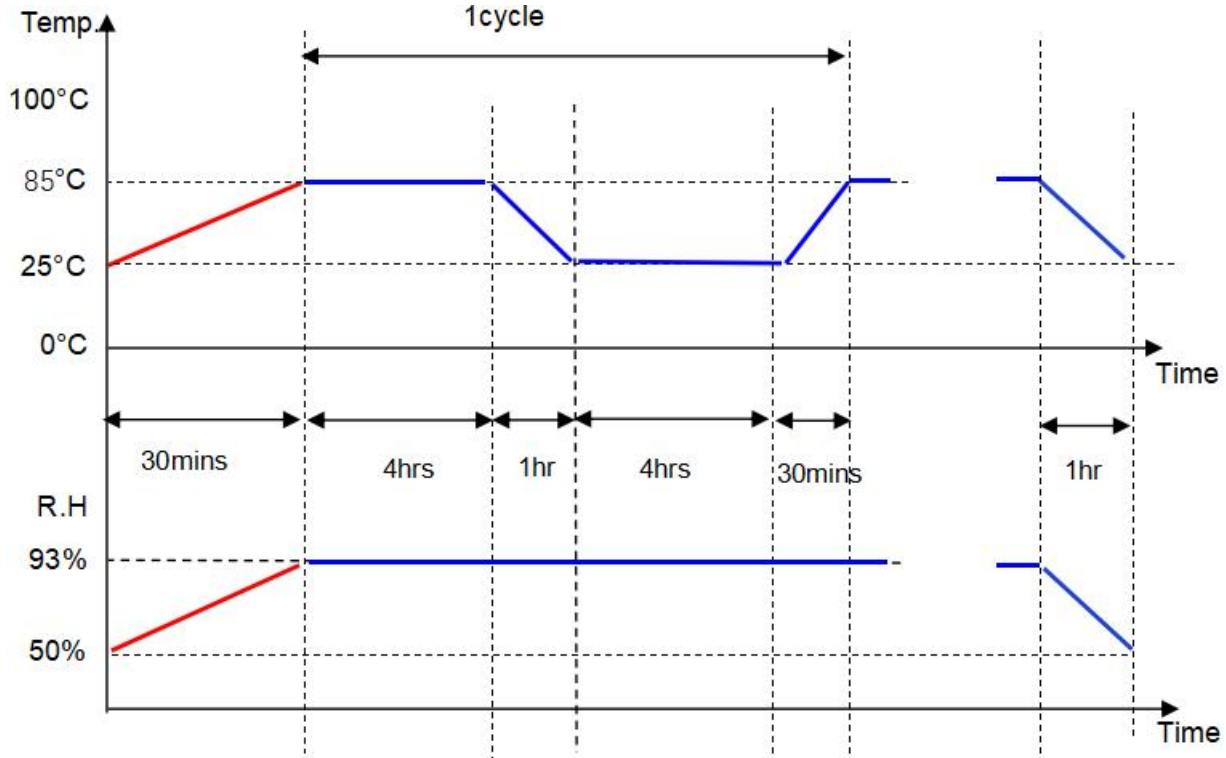
9. 交变湿热测试 (Alternating hot and humid test)

测试条件:

- 1. 85 ° C+93%RH 运行 4hrs;
- 2. 25 ° C+93%RH 运行 4hrs;
- 循环步骤 1 步骤 2 总共 2 个循环.

测试曲线:

Is Power Off ————
Is Power On ————



测试标准:

1. 正常运行时功能正常, 确认 ping 包不丢失, 即判定模组功能正常。
2. 测试过程中打开 BLE 调试助手搜索蓝牙名称如 (BL-AT7/8/9/10/11/12), 如搜索不到即测试失败。
3. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

测试样机	测试数据	测试结果
<p>6pcs (BL-AT7~BL-AT12)</p>		<p>PASS</p>

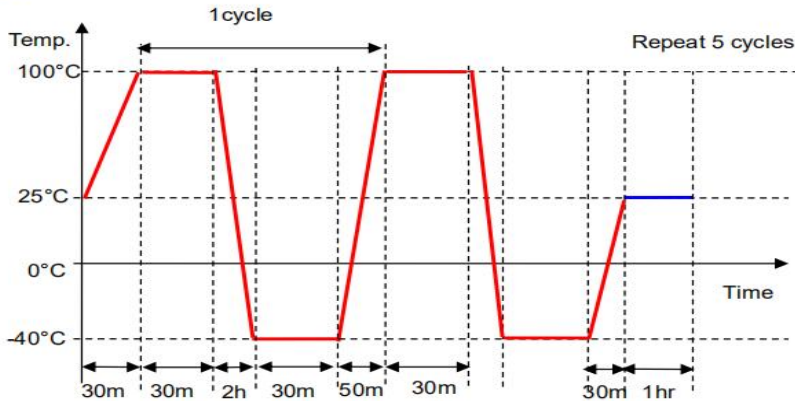
10. 冷热冲击测试 (Thermal shock test)

测试条件:

关机测试, $-40^{\circ}\text{C} \sim 100^{\circ}\text{C}$ 转换, 温度转换时间为升温 50mins, 降温 2hrs. 每个阶段保持 30mins, 运行 5 cycles.

测试曲线:

Is Power Off
Is Power On



测试标准:

1. 上电工作后能够正常启动, 测试过程中机器正常启动, 确认 ping 包不丢失, 即判定模组功能正常。
2. 测试过程中打开 BLE 调试助手搜索蓝牙名称如 (BL-AT7/8/9/10/11/12), 如搜索不到即测试失败。
3. 产品测试完后没有可见的损伤, 如收缩、剥离、变色等现象。

测试样机	测试数据	测试结果
<p>6pcs (BL-AT7~BL-AT12)</p>		<p>PASS</p>